US006234826B1

(12) **United States Patent**
Wilber et al.

(10) **Patent No.: US 6,234,826 B1**
(45) **Date of Patent: May 22, 2001**

(54) **CONNECTOR POSITION ASSURANCE DEVICE**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/302,992**

(22) Filed: **Apr. 30, 1999**

(51) **Int. Cl.**[7] **H01R 13/627**
(52) **U.S. Cl.** **439/352**; 439/489
(58) **Field of Search** 439/489, 488, 439/352–358, 350

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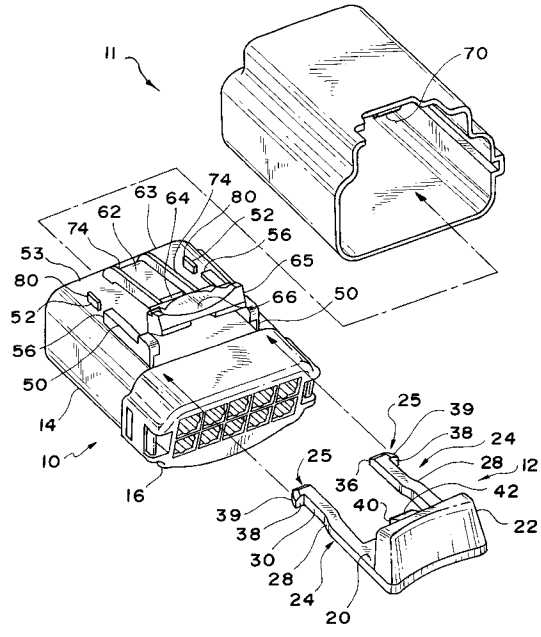
(57) **ABSTRACT**

A connector includes a first housing half and a second housing half, with one of the connector halves being a socket half, and the other connector half being a plug half. A latching mechanism is provided so that when the connector halves are assembled, they are latched together in the assembled position. A CPA device is also provided which is independent of the connector halves. The CPA device may be securely mounted on one of the connector halves prior to assembly of the connector halves. Following latching of the connector halves into the assembled condition, the CPA device may be slid forward to a final position to lock the latching mechanism to prevent the connector from being inadvertently unlatched. Also, if the connector halves are not fully and properly assembled, it is not possible to slide the CPA device into the final position. Additionally, after the CPA device is seated in its final position, the two connector halves cannot be disconnected from each other unless the CPA device is manually slid back to the initial or "ready" position. However, in order to disassemble the connector, the CPA device must be manually disengaged from the final locked position, and moved to the initial unlocked position, before the latch may be manually unlatched so that the connector halves may be unmated.

20 Claims, 6 Drawing Sheets



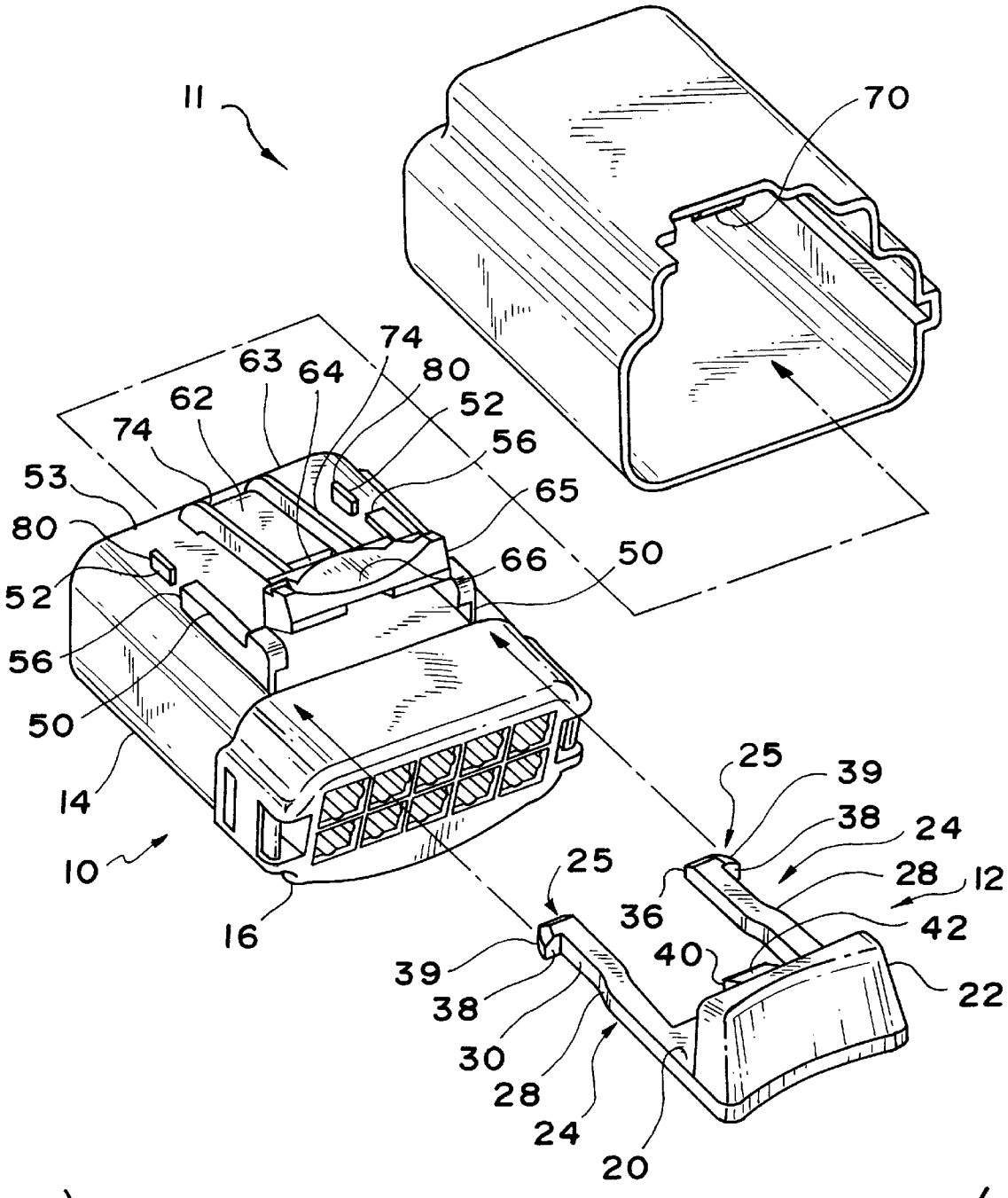

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FIG. 1

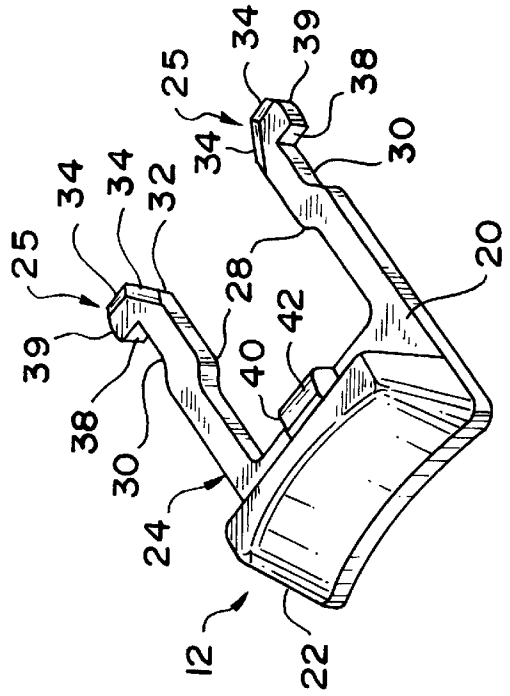

FIG. 2a

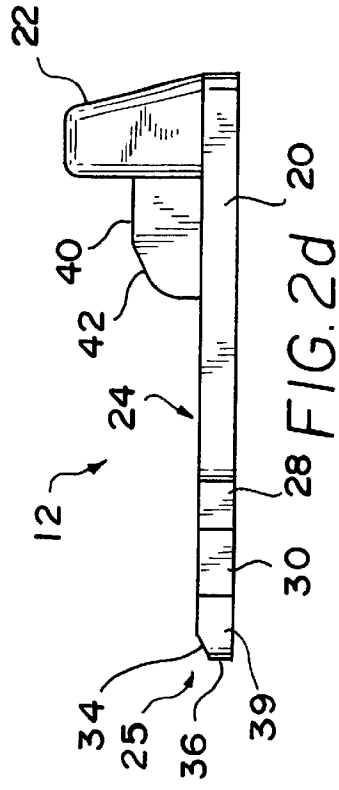

FIG. 2d

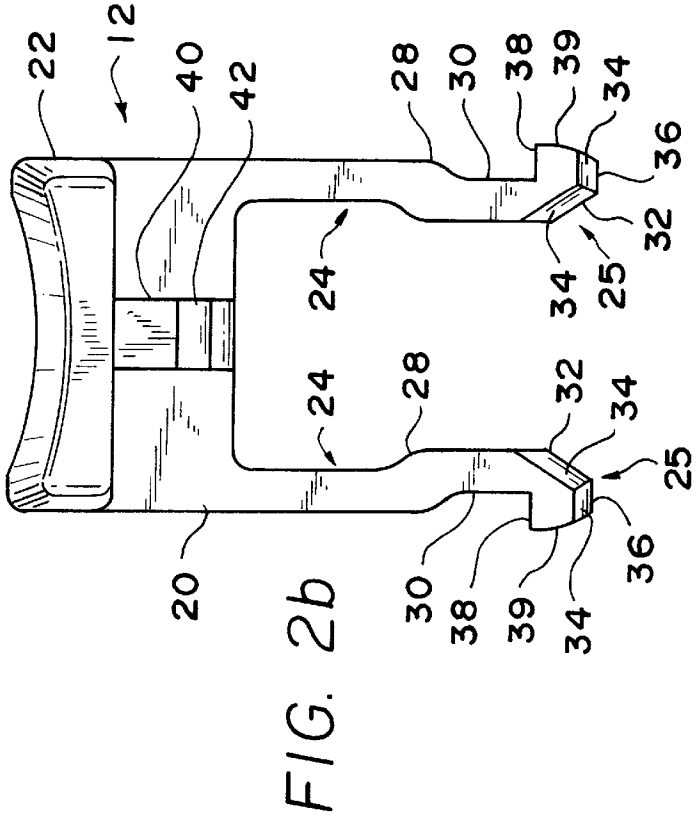

FIG. 2b

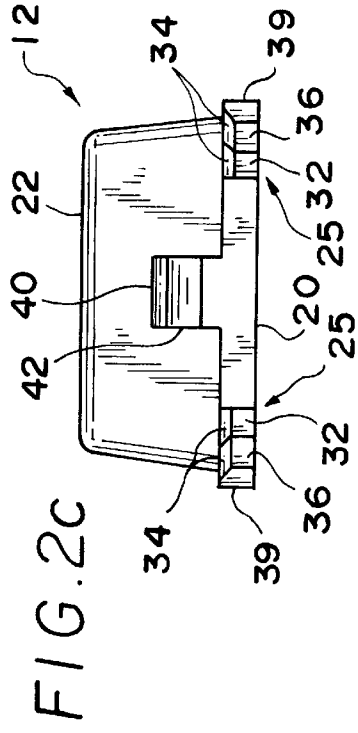

FIG. 2c

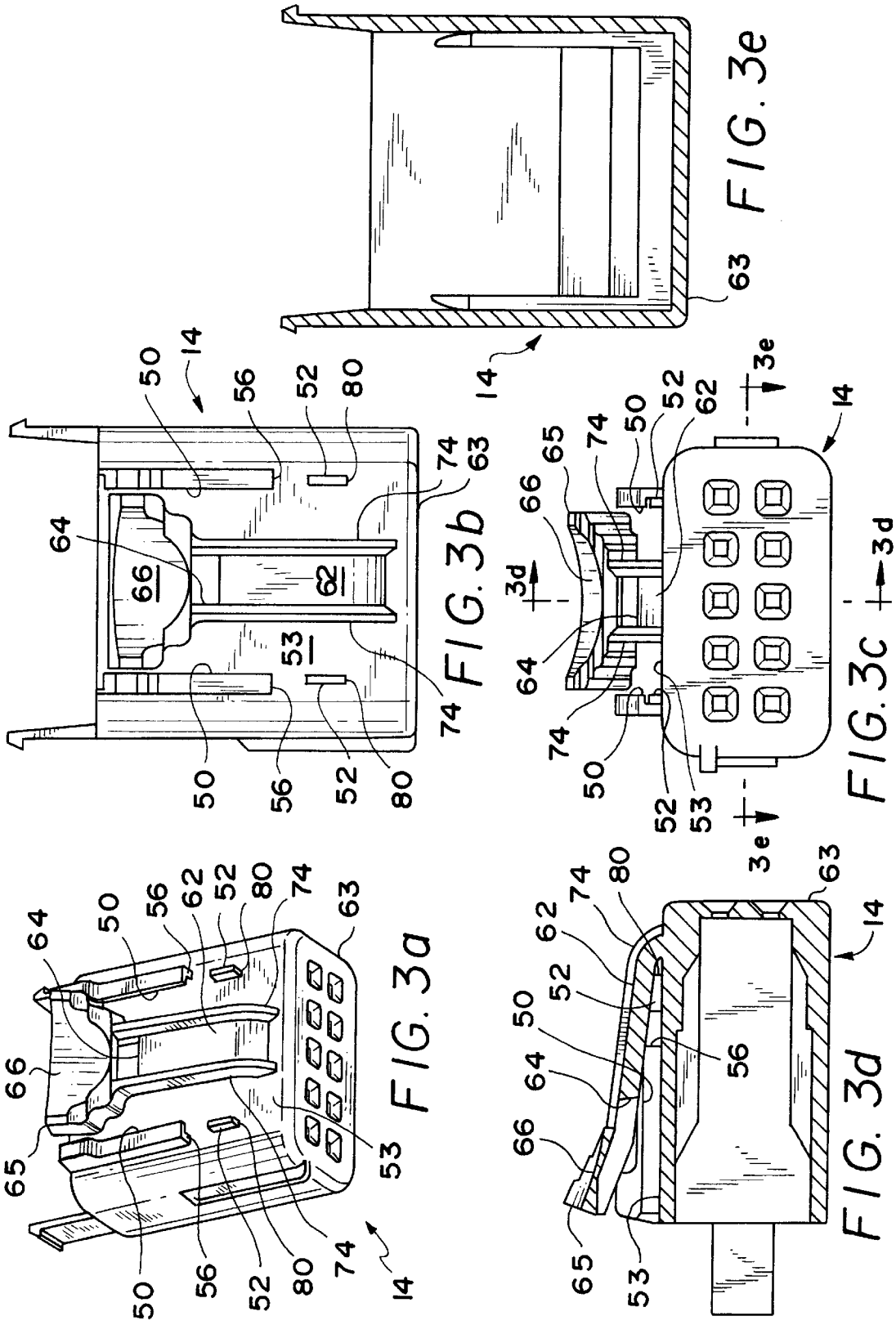

FIG. 3a

FIG. 3b

FIG. 3c

FIG. 3d

FIG. 3e

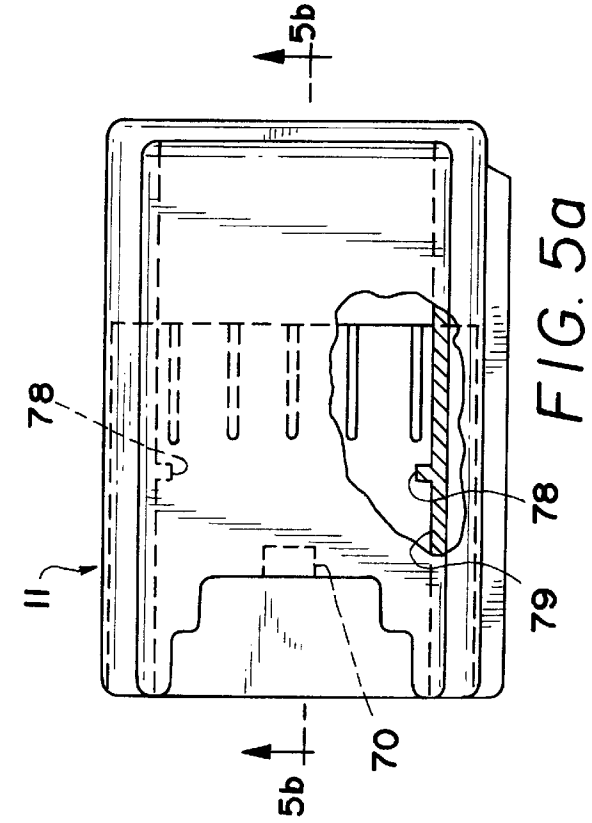

FIG. 5a

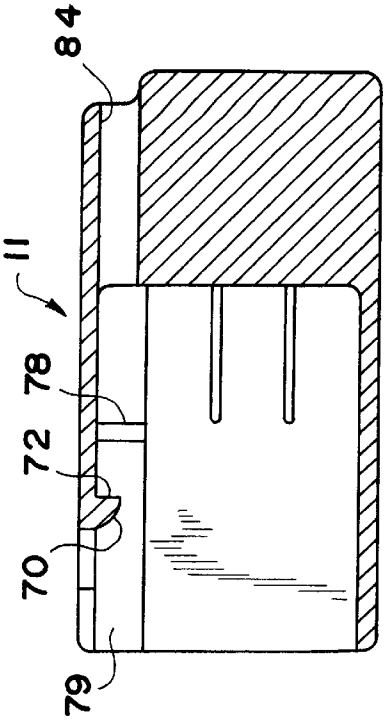

FIG. 5b

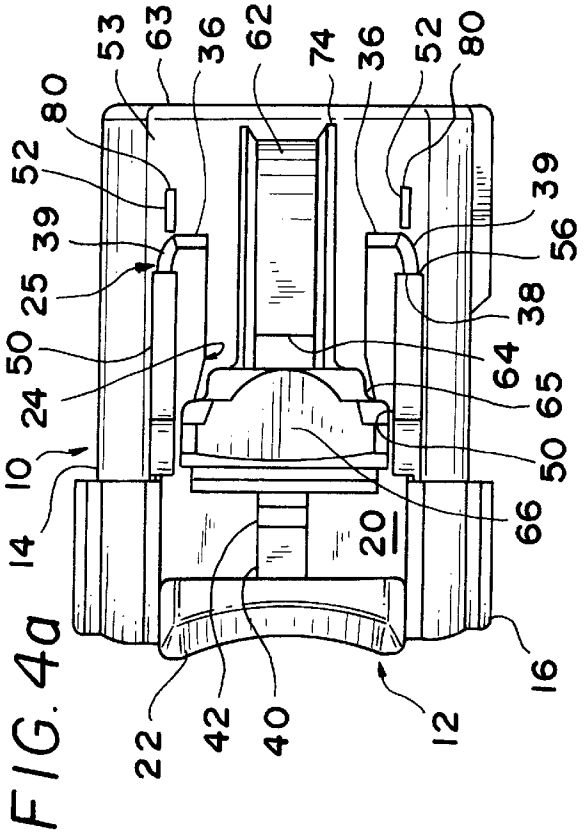

FIG. 4a

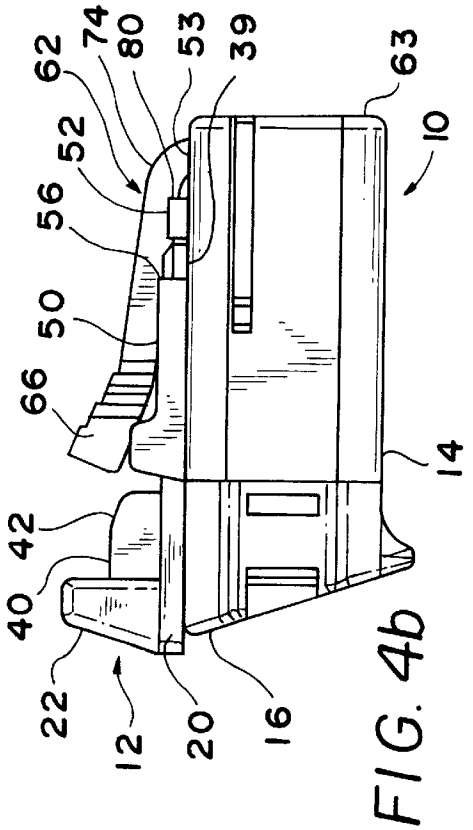

FIG. 4b

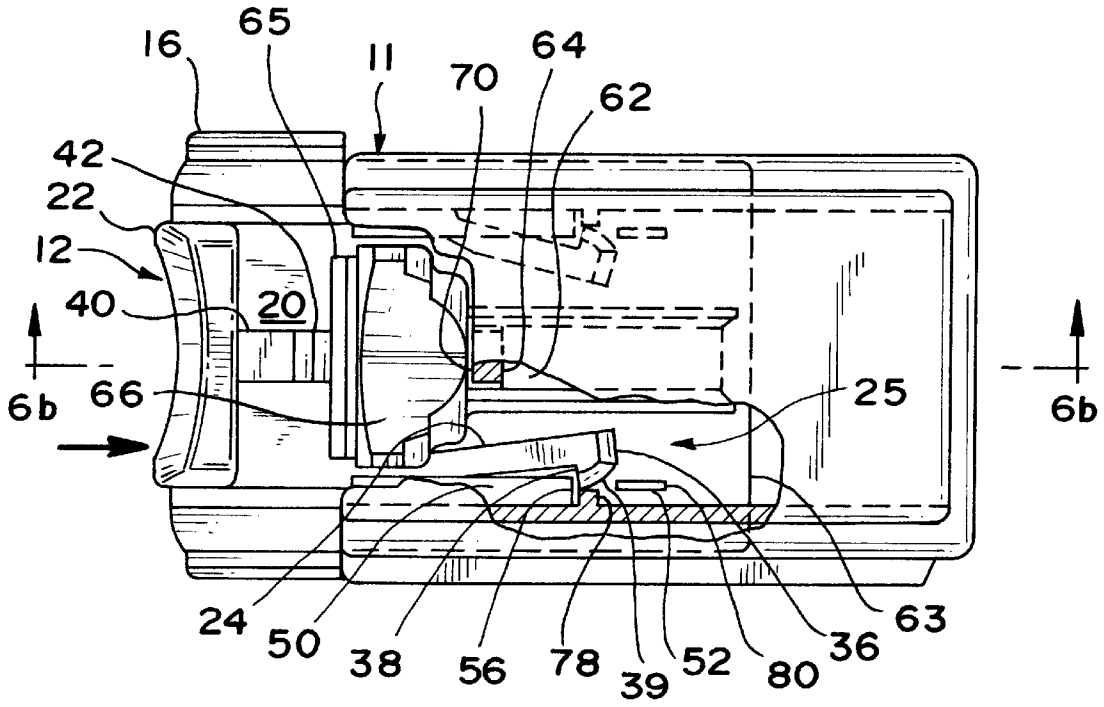
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FIG. 6a

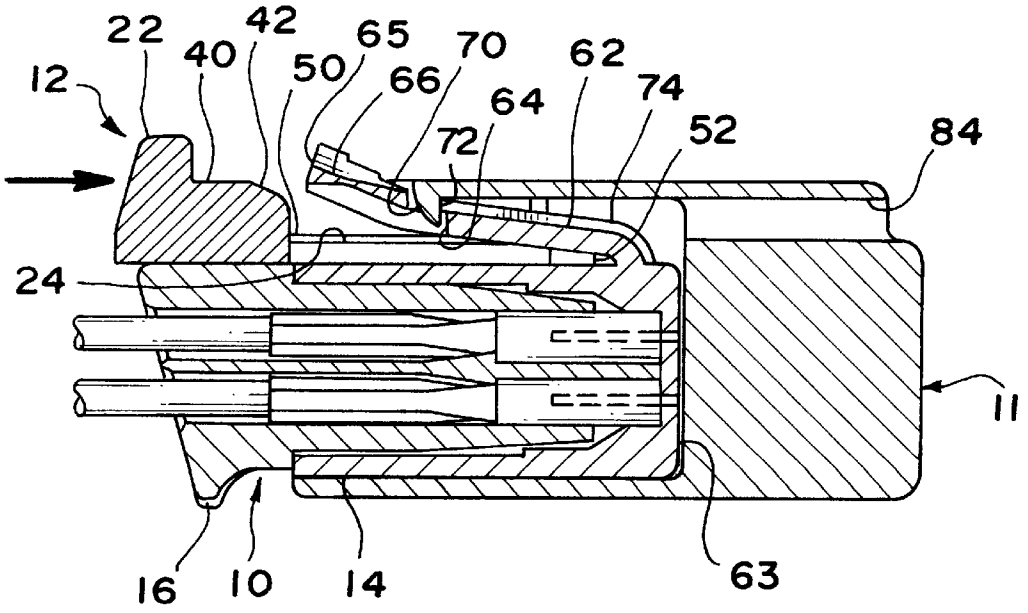
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FIG. 6b

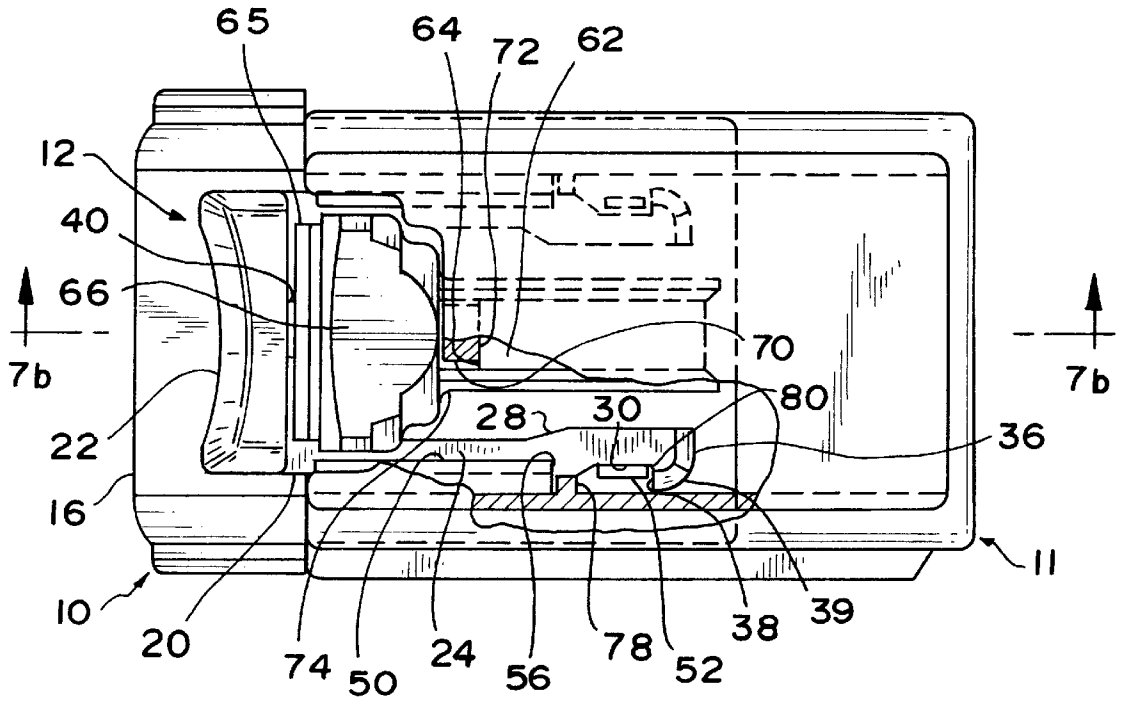
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FIG. 7a

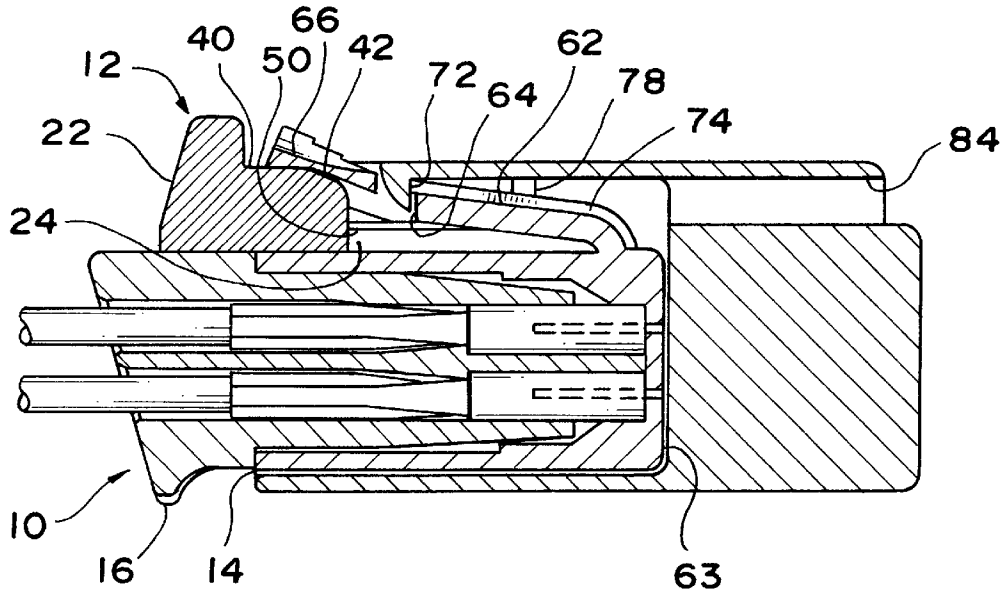
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FIG. 7b

CONNECTOR POSITION ASSURANCE DEVICE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to an electrical connector system, and, more particularly, to a connector position assurance device for assuring proper connection and providing secure latching when connecting two halves of an electrical connector.

2. Description of the Prior Art

An electrical connector typically includes a pair of connector housing components or halves constructed from a dielectric material. The housing halves are usually identified as a plug half (or male half) and a socket half (also referred to as the receptacle half or female half). The two halves have complementary inter-engaging conductive terminals for completing an electrical circuit when the housing halves are fully and properly mated. The plug half generally has one or more projecting conductive pins which are inserted into one or more conductive receptacles or sockets on the socket half. The contact between the pins and sockets forms the electrical connection between the two connector halves.

Electrical connectors normally require a secure mechanical and electrical engagement between the two connector halves. Some prior art connectors rely only on friction to hold the connector halves together, and are relatively easy to separate or unmate, thereby disconnecting the electrical circuit. Obviously, inadvertent separation of a connector may cause malfunction of the equipment and associated inconvenience, safety concerns, or the like.

To prevent unintentional separation of the connector halves, a latching means is often included with the connector housing for holding the male and female connector halves in the engaged position. The latching means may also include a locking means to retain the connector in the latched position and to provide assurance to a person assembling the connector that the connector has been properly assembled, latched, and locked, and that the electrical connection is therefore complete. Such locking and indicating mechanisms are known in the art as connector position assurance ("CPA") devices. A CPA device may be separate from the latching mechanism, or may be integrated as part of the latch. Typically, the primary function of a CPA device is to indicate that the connector halves are fully mated and latched. A secondary function is often to prevent the latching mechanism from inadvertently unlatching, so that the connector halves will not separate. Thus, CPA devices provide visual and mechanical assurance of the relative positions of the connector components, and thereby verify the complete mating of the components.

Latching mechanisms incorporating CPA devices have been accomplished in a wide variety of ways in the prior art. For example, U.S. Pat. No. 5,759,058, to Jonathan Childs, assigned to the same assignee as in the present application, discloses an electrical connector having two connector halves, with a latching mechanism and a CPA device. The latching mechanism includes a flexible arm on a first connector half and a shoulder on a second connector half. As the connector halves are assembled, the flexible arm engages with the shoulder for latching the connector halves together. Following latching of the connector halves, a CPA device may then be slid forward and snapped into a final locked position. In this position, the CPA device prevents the flexible latching arm from disengaging from the shoulder, and, accordingly, the connector halves may not be unlatched.

Further, if the connector halves are not properly mated, the CPA device is not able to slide into its proper forward position, thereby giving an indication of improper assembly of the connector halves.

Other prior art patents have described a wide variety of CPA devices. For example, U.S. Pat. No. 5,120,255, to T. Kouda, et al., discloses a connector position assurance component for utilization with a connector in which either the plug half or the socket half incorporates a tabbed latch. This tabbed latch pushes down on the CPA component during mating of the first connector half to the second connector half, thereby freeing the CPA component and allowing it to be moved manually into its final position.

The prior art also discloses a connector having a lock-release-prevention device which includes a flexible arm having a projection which causes the arm to bend as the connector halves are assembled. This moves the end of the flexible arm to prevent a sliding portion from locking into a final position if the connector halves are not properly assembled. Other prior patents show electrical connectors having a locking arm that is pivotally connected, or having a locking arm with a resilient bar, with a CPA device which slides or locks into place after the two connector halves are properly mated.

While the foregoing latch and CPA mechanisms function effectively for their intended applications, the components can be relatively bulky. The components are typically molded from plastic, and, thus, must be sufficiently thick to perform their intended function without cracking or breaking, while still being able to flex during assembly. Accordingly, it is desirable to provide an alternative latch and CPA mechanism whose functional components enable a lower profile and more compact construction than those of the prior art, without sacrificing strength and functionality. The latching mechanism and CPA device of the present invention provide these and other benefits, and overcome the shortcomings associated with the prior art.

SUMMARY OF THE INVENTION

In the preferred form of the invention, a connector includes a first housing half and a second housing half, with one of the connector halves being a socket half, and the other connector half being a plug half. A latching mechanism is provided so that as the connector halves are assembled, they are latched together in the assembled position. A CPA device is also provided which is independent of the connector halves. The CPA device may be securely mounted on one of the connector halves prior to assembly of the connector halves. Following latching of the connector halves into the assembled condition, the CPA device may be slid forward to a final position to lock the latching mechanism to prevent the assembled connector from being inadvertently unlatched. Also, if the connector halves are not fully and properly assembled, it is not possible to slide the CPA device into the final position. Additionally, after the CPA device is seated in its final position, the two connector halves cannot be unlatched from each other unless the CPA device is manually slid back to the initial or "ready" position. However, in order to disassemble the connector, the CPA device must be manually disengaged from the final locked position and moved to the initial unlocked position before the latch may be manually unlatched so that the connector halves may be unmated.

The CPA device of the present invention comprises a molded plastic component including a generally planar body having two forwardly extending basically parallel legs

located in generally the same plane as the planar body. The legs are generally mirror images of each other, and each leg includes a dogleg segment along a mid portion of the leg and a flat stub area on the distal tip. The tips of the legs are beveled to facilitate insertion of the CPA device into guide channels located on one of the connector half housings. Each leg tip further includes a convex engagement area on the outer side of the tip for engagement with release projections on the other connector half. Each leg further includes a locking surface adjacent to the dogleg area for holding the CPA device in the final position once the CPA device has been slid forward. Also, when the CPA device is mounted on the connector housing in the initial ready position, this locking surface engages with a portion of the connector housing for securely mounting the CPA device on the connector housing.

The CPA device further includes a push pad which projects upward from the planar body for use in manually pushing against the CPA device with a thumb, finger, or the like, to insert and slide forward the CPA device. Also, a latch restraint projects upward from the planar body adjacent to the push pad. The latch restraint is centrally located on the planar body and extends perpendicular to the push pad. When the CPA device is in the final position, the latch restraint is located under a portion of the latch mechanism, and prevents the connector latch from being unlatched.

The CPA device may be mounted on the first connector half prior to assembly of the first connector half to the second connector half. The first connector half includes a pair of parallel guide channels for receiving the legs of the CPA device. When mounting the CPA device on the first connector half, the legs of the CPA device are inserted into the guide channels. The CPA device then may be slid forward and snapped into the initial ready position as the locking surfaces of the legs exit the forward ends of the guide channels and the locking surfaces spring slightly outward to engage with the forward ends of the guide channels. This engagement between the locking surfaces and the forward ends of the guide channels prevents easy withdrawal of the CPA device from its ready position once it is mounted on the first connector half. Also, the stub surfaces on the tips of the legs will contact raised lugs projecting upward from the surface of the first connector half housing. The contact between the stub surfaces and the raised lugs prevents further forward movement of the CPA device prior to assembly of the connector halves.

When the first connector half is assembled to the second connector half, disengagement projections on the second connector half contact the convex engagement surfaces on the tips of the CPA legs, forcing the legs inward. This disengages the stub surfaces from the raised lugs, and the CPA device may then be slid forward to its final position. However, if the second connector half is not completely mated to the first connector half, then the disengagement projections do not contact the legs of the CPA device, and the stub surfaces remain engaged with the raised lugs on the first connector half, thereby preventing the CPA device from being moved to its final position.

The first connector half further includes a latching mechanism which engages with the second connector half upon mating to latch the two connector halves together. In the preferred embodiment described, the latch mechanism includes a reverse-cantilevered latch arm located on the exterior of the first connector half, and the latch arm has an aperture formed therein. A ramped, tooth-like latch projection extends downward from the second connector housing and, when the connector halves are assembled, the latch projection enters into the aperture on the cantilevered latch arm. A perpendicular surface on the rear side of the latch projection prevents the connector halves from being pulled apart following assembly. The latch arm must be depressed to disengage the latch projection from the aperture in the latch arm to allow unmating of the connector halves. However, when the CPA device is in the final position, the latch arm cannot be depressed because the CPA latch restraint is located directly under the latch arm. Accordingly, so long as the CPA device is in the final forward position, the connector halves cannot be unlatched.

Thus, the present invention provides a low profile, compact, reliable, and ergonomic latching and CPA mechanism for use with an electrical connector or the like. Furthermore, while the preferred embodiment of the invention is described in conjunction with the latching mechanism for a particular two-part electrical connector for a wiring harness or the like, it may be equally well used with other latchable devices, and is not limited to use with electrical connectors or the particular latch configuration shown.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and additional objects, features, and advantages of the present invention will become apparent to those of skill in the art from a consideration of the it following detailed description of a preferred embodiment of the invention, taken in conjunction with the accompanying drawings.

FIG. **1** is a perspective view of two halves of an electrical connector and a CPA device in accordance with the preferred embodiment of the present invention.

FIG. **2***a* is an enlarged reverse-angle perspective view of the CPA device of FIG. **1**.

FIG. **2***b* is an enlarged plan view of the CPA device of FIG. **2***a*.

FIG. **2***c* is a front view of the CPA device of FIG. **2***b*

FIG. **2***d* is a side view of the CPA device of FIG. **2***c*.

FIG. **3***a* is a reduced-scale perspective view of the first connector half of FIG. **1**, with the insert portion of the connector removed.

FIG. **3***b* is an enlarged plan view of the first connector half of FIG. **3***a*.

FIG. **3***c* is a front view of the first connector half of FIG. **3***b*.

FIG. **3***d* is a cross sectional view of the first connector half of FIG. **3***c*, as taken along line **3***d*—**3***d*.

FIG. **3***e* is a cross sectional view of the first connector half of FIG. **3***c*, as taken along line **3***e*—**3***e*.

FIG. **4***a* is a plan view of the first connector half of FIG. **1**, with the CPA device of the invention installed in the initial or "ready" position.

FIG. **4***b* is a side view of the first connector half and CPA device of FIG. **4***a*.

FIG. **5***a* is a plan view of the second connector half of the invention.

FIG. **5***b* is a cross-sectional view of the second connector half of FIG. **5***a*, as taken along line **5***b*—**5***b*.

FIG. **6***a* is a plan view showing the first connector half assembled to the second connector half, and with the CPA device still in the initial position.

FIG. **6***b* is a cross-sectional view of the assembly illustrated in FIG. **6***a*, as taken along line **6***b*—**6***b*.

FIG. **7***a* is a plan view of the assembly of FIG. **6***a*, illustrating the CPA device moved to the final position.

FIG. 7*b* is a cross-sectional view of the assembly illustrated in FIG. 7*a*, as taken along line 7*b*—7*b*.

DETAILED DESCRIPTION

Turning now to a more detailed description of the present invention, there is illustrated in FIG. **1** an electrical connector including a first connector half **10** a second connector half **11**, and a CPA device **12** in accordance with the present invention. First connector half **10** is illustrated as a socket half of a connector and second connector half **11** is illustrated as a plug half of the connector, but these configurations could easily be reversed. First connector half **10** is illustrated as a two-piece connector half, and includes a connector housing **14** and a connector insert **16**. Connector housing **14** and connector insert **16** are designed so that insert **16** fits within housing **14** to facilitate installation of socket terminals (not shown). First connector half **10** may be inserted into second connector half **11** for forming an electrical connection.

First connector half **10** is described in more detail in applicants' co-pending patent application entitled "Electrical Connector Having a Two-Piece Socket Portion", filed on an even date herewith, to the same inventors as herein, to the same assignee as herein, under attorney docket no. WILB-US1, U.S. Pat. AppI. No. TBA, and the disclosure of which is incorporated herein by reference. It will be apparent however, that CPA device **12** may be used with any appropriately patterned connector, or configured for any intended connector application, and, thus, the particular configuration of connector half **10** is not critical to the invention so long as the proper features are included on the connector housing surface, as set forth below. Accordingly, the invention may be used with any type of interfitting connectors, and the invention is not limited to the particular arrangement shown.

As illustrated in FIGS. 2*a*–2*d*, CPA device **12** includes a generally planar body portion **20**. A contoured push pad **22** extends generally perpendicularly upward from planar body **20** for enabling a user to manually push CPA device **12** from an initial position to a final position during installation and use of CPA device **12**. A pair of legs **24** extend forward from planar body **20**, generally in the same plane as planar body **20**. Legs **24** are basically mirror images of each other, and extend distally of planar body **20** generally parallel to each other. Each leg **24** includes a dogleg segment **28** which creates an indented area **30** whose purpose will be explained in more detail below. The distal tip **25** of each leg **24** also includes a vertically-formed inner bevel **32** and a pair of obliquely formed forward bevels **34**. Bevels **32**, **34** facilitate insertion of CPA device **12** into first connector half **10**. Each leg **24** further includes a flat stub surface **36** on its distal end and a flat lock surface **38**, opposite to stub surface **36**, and within indented area **30**. The tip **25** of each leg **24** also includes a convexly-curved engagement area **39** which is adjacent to stub surface **36**, and which interfaces with a mating connector half during assembly of the connector, as described in more detail below.

CPA device **12** also includes a generally rectangular latch restraint **40** which is centrally located on planar body **20**, and which extends generally perpendicularly upward from planar body **20**, adjacent and perpendicular to push pad **22**. Latch restraint **40** includes a ramped latch engagement surface **42** which engages with a latch mechanism, as described below, on first connector half **10** to prevent the latch from being unlatched to disassemble a mated connector. Also, it will be apparent that CPA device **12** may be constructed of any suitable material, but is preferably a molded thermoplastic having sufficient flexibility to allow the distal tips **25** of legs **24** to flex inward toward each other and return to their original configuration.

CPA device **12** may be mounted on first connector half **10** prior to assembly of first connector half **10** to second connector half **11**. First connector half **10** includes housing portion **14** and insert portion **16** which also may be constructed of any suitable material, but preferably are constructed of a dielectric thermoplastic so that injection molding may be used for manufacturing. FIGS. 3*a*–3*e* illustrate housing **14** with insert **16** removed. Housing **14** includes a pair of parallel guide channels **50** for receiving legs **24** of CPA device **12** when CPA device **12** is mounted on first connector half **10**. Located distally of each guide channel **50** is a rectangular raised lug **52** which projects upward from the surface **53** of connector housing **14**. Raised lugs **52** engage with stub surfaces **36** on CPA device **12** for preventing forward movement of CPA device **12** prior to assembly of first connector half **10** to second connector half **11**.

To load CPA device **12** onto first connector half **10**, and into the ready position, as illustrated in FIGS. 4*a* and 4*b*, legs **24** are inserted into guide channels **50**. The distance between guide channels **50** is slightly less that the width between the outside edges of convex engagement areas **39** on CPA legs **24**. Thus, as CPA device **12** is slid forward in guide channels **50**, CPA device **12** will snap into position as locking surfaces **38** of legs **24** exit from guide channels **50** and engage with the forward ends **56** of guide channels **50**. The interface of locking surfaces **38** with forward ends **56** of guide channels **50** prevents CPA device **12** from being withdrawn from channels **50**. In addition, as CPA device **12** is pushed forward, stub surfaces **36** on the tips **25** of legs **24** contact raised lugs **52**. Raised lugs **52** prevent further forward movement of CPA device **12**. Thus, CPA device is securely mounted in the initial ready position, and may be so retained in this position on first connector half **10** until assembly of the connector halves **10**, **11**.

Accordingly, CPA device **12** may be mounted on first connector half **10** at any time prior to assembly of first connector half **10** to second connector half **11**. Alternatively, CPA device **12** may be installed on first connector half **10** following assembly of first connector half **10** to second connector half **11**. Also, for the particular configuration illustrated, CPA device **12** may be installed on housing **14** prior to insertion of insert **16** into housing **14**, or after insertion of insert **16** into housing **14**. Thus, CPA device **12** may be installed early in the assembly process, and is securely retained on first connector half **10** in a position ready for use. Any number of pre-assembly steps may be performed with CPA device **12** installed in the ready position. Then, following assembly of first connector half **10** to second connector half **11**, stub surfaces **36** are disengaged from raised lugs **52**, as will be described below, and CPA device **12** may be moved from the ready position to the final locked position.

First connector half **10** further includes a latching mechanism **60** which engages with second connector half **11** upon assembly to latch together the two connector halves **10**, **11**. In the preferred embodiment described, latch mechanism **60** includes a centrallylocated reverse-cantilevered latch arm **62** which extends rearward from the mating end **63** of connector half **10**. Latch arm **62** has a latching aperture **64** formed through it near the free end **65** of arm **62**. Latch arm **62** is preferably molded contiguously with housing **14**, and is resilient in nature so that the free end **65** may be depressed toward surface **53** of housing **14** and then spring back to its initial position. Latch arm **62** further includes a finger pad **66**

formed on its free end **65** to facilitate depression of latch arm **62**, using a finger or the like, when unlatching first connector half **10** from second connector half **11**.

As illustrated in FIGS. **5***a*, **5***b*, **6***a*, **6***b*, **7***a* and **7***b*, second connector half **11** includes a tooth-like ramped latch projection **70** which extends downward from second connector half **11**. During assembly of first connector half **10** to second connector half **11**, ramped latch projection **70** rides up latch arm **62** and enters into aperture **64**. The inherent resilience of latch arm **62** causes latch projection **70** to snap into aperture **64** and be retained therein. Also, latch arm **62** may include side flanges **74** formed along its length. Side flanges **74** act as guides for latch projection **70** during assembly, and also increase the stiffness of latch arm **62**. A perpendicular surface **72** on the rear side of latch projection **70** engages with the edge of aperture **64** and prevents the connector halves **10**, **11** from being pulled apart following assembly. Latch arm **62** must be depressed to disengage aperture **64** from latch projection **70** for enabling disassembly of connector halves **10**, **11**.

Second connector half **11** further includes a pair of disengagement projections **78** located on its inside surface **79**. As illustrated in FIG. **6***a*, when first connector half **10** is assembled to second connector half **11**, disengagement projections **78** on second connector half **11** are located between lugs **52** and the forward ends **56** of guide channels **50**. In this position, disengagement projections **78** contact the convexly-curved engagement areas **39** on the tips **25** of CPA legs **24**. When second connector half **11** is fully mated with first connector half **10**, disengagement projections **78** forced legs **24** to flex inward, as illustrated in FIGS. **6***a* and **6***b*. This disengages stub surfaces **36** from contact with raised lugs **52**, and CPA device **12** may then be pushed forward to its final position, as illustrated in FIGS. **7***a* and **7***b*. However, if second connector half **11** is not completely mated to first connector half **10**, then disengagement projections **78** do not contact CPA legs **24**, and stub surfaces **36** remain engaged with raised lugs **52**, thereby preventing CPA device **12** from being moved to its final position.

Furthermore, as illustrated in FIG. **7***a*, when CPA device **12** is moved to the final full forward and locked position, lugs **52** are circumscribed within the indented areas **30** formed by doglegs **28**. Locking surfaces **38** engage with the forward edges **80** of lugs **52** which prevents CPA device **12** from being withdrawn from the final position. To withdraw CPA device **12** back to the ready position, legs **24** must be moved inward toward each other a sufficient distance to disengage locking surfaces **38** from forward edges **80** of lugs **52**. One way of accomplishing this may be by reaching a tool (not shown) through opening **84** in second connector half **11**. Alternatively, locking surfaces **38** may be formed at an oblique angle to legs **24**, rather than perpendicular, as shown. Then, a sufficient rearward force would cause disengagement of surface **38** from the forward edges **80** of lugs **52**, and enable movement of CPA device **12** back to the ready position.

Additionally, when CPA device **12** is in the final position, latch arm **62** cannot be depressed because CPA latch restraint **40** is located directly under the latch arm **62** and finger pad **66**, as illustrated in FIG. **7***b*. Latch engagement surface **42** on latch restraint **40** is preferably in direct contact with the underside of latch arm **62** when CPA device **12** is in the final locked position. But latch restraint **40** also may merely be sufficiently close to prevent latch arm **62** from being depressed far enough to release latch projection **70** from aperture **64**. It will be apparent that so long as CPA device **12** is in the final locked position, latch arm **62** cannot be depressed, and the connector halves **10**, **11** cannot be unlatched.

In addition, it should be understood that alternative latching mechanisms may be substituted for the latching mechanism **60** illustrated in the preferred embodiment. For example, a pivotally mounted latch arm (not shown) may replace latch arm **62**, and may include a tooth like latch projection on the end thereof. The projection may enter an aperture formed on the second connector half, and latch restraint **40** may be inserted under the opposite end of the pivotally-mounted arm to prevent its being depressed to unlatch the latching mechanism. The remaining features, such as guide channels **50** and raised lugs **52**, would be retained, and CPA device **12** would still function as described above.

From the foregoing it will be apparent that there is provided a novel CPA device **12** and latching mechanism **60** which enables the two connector halves **10**, **11** to be securely engaged and latched. The latching mechanism **60** is more compact and lower in profile than many conventional latching systems, enabling the manufacture of smaller connectors. In addition, because CPA device **12** may be mounted on the first connector half **10** at any point during the assembly process, CPA device **12** provides great flexibility in its use. CPA device **12** of the present invention provides a secure and simple means for locking the latching mechanism **60** of the invention. Since CPA device **12** cannot be moved to the full forward position unless the first connector half **10** is properly assembled and latched to the second connector half **11**, CPA device **12** provides visual and mechanical assurance of proper connection between connector halves **10**, **11** when CPA device **12** is in the final forward position.

Furthermore, CPA device **12** prevents unintentional unlatching of the latch mechanism **60** by preventing latch arm **62** from being depressed far enough to release latch projection **70**. Accordingly, CPA device **12** also acts as a lock for securing the connector halves **10**, **11** in the latched position. However, CPA device **12** may be removed if desired to enable unlatching of latch mechanism **60** and disconnection of the connector halves **10**, **11**. Thus, although the present invention has been described in terms of preferred embodiments, it will be apparent that variations and modifications may be made without departing from the true spirit and scope thereof, as set forth in the following claims.

What is claimed:

1. In combination, a first connector half, a second connector half, and a connector position assurance (CPA) device, comprising:

a first connector half having a pair of generally parallel guide channels on the outer surface thereof and at least one raised lug near the end of said guide channels;

a second connector half mateable with said first connector half, said second connector half having at least one disengagement projection; and

a CPA device mountable within said guide channels on said first connector half, said CPA device including a planar body and a pair of generally parallel legs extending outward therefrom, at least one of said legs including a stub surface at the distal tip thereof for contacting said at least one raised lug for preventing forward movement of said CPA device, said at least one leg further including a locking surface spaced proximally of said stub surface and an engagement area extending between said stub surface and said locking surface, whereby, when said first connector half is properly assembled to said second connector half, said at least one disengagement projection on said second connector half contacts said engagement area on said at least

one leg for disengaging said stub surface from said raised lug so that said stub surface may be moved past said raised lug whereby said locking surface engages into contact with a forward edge of said raised lug to prevent removal of said CPA device such that said CPA device is thereby located in a final locked position indicative of proper assembly of the first connector half with the second connector half.

2. The combination of claim **1** wherein each said leg includes a said stub surface, a said engagement area, and a said locking surface.

3. The combination of claim **1** wherein said engagement area is a generally convexly-curved surface.

4. The combination of claim **1** further including a latch mechanism, said latch mechanism including a latch arm located on the surface of said first connector half, said latch arm being resiliently attached to said first connector half for engagement with a portion of said second connector half to latch said first connector half to said second connector half when said first connector half is properly mated to said second connector half.

5. The combination of claim **4** further including an aperture in said latch arm for receiving a projection located on said second connector half, whereby when said first connector half is assembled to said second connector half, said projection enters said aperture for latching said first connector half to said second connector half.

6. The combination of claim **5** wherein said latch arm has as a reverse cantilever configuration.

7. The combination of claim **4** further including a latch restraint projecting upward from said planar body of said CPA device such that when said CPA device is located in said final position, said latch restraint will prevent movement of said latch arm, thereby preventing unlatching of said latch mechanism.

8. In combination, a first connector half, a second connector half, and a connector position assurance (CPA) device, comprising:

a first connector half having a pair of generally parallel guide channels on the outer surface thereof and a pair of raised lugs located at a distance spaced from the ends said guide channels;

a second connector half mateable with said first connector half, said second connector half having a pair of opposed disengagement projections; and

a CPA device mountable within said guide channels on said first connector half, said CPA device including a planar body and a pair of generally parallel legs extending outward therefrom, said legs including a stub surface at the distal tips thereof for contacting said raised lugs for preventing forward movement of said CPA device when said CPA device is mounted in an initial pre-lock position on said first connector half, said legs further including locking surfaces spaced proximally of said stub surfaces and engagement areas extending between said stub surfaces and said locking surfaces, said locking surfaces contacting the ends of said guide channels in the pre-lock position for preventing removal of said CPA device from said first connector half, whereby, when said first connector half is properly assembled to said second connector half, said disengagement projections on said second connector half contact said engagement areas on said legs for disengaging said stub surfaces from said raised lugs so that said stub surfaces may be moved past said raised lugs, whereby said locking surfaces engage in contact with forward edges of said raised lugs to prevent removal of said CPA device such that said CPA device is thereby located in a final locked position indicative of proper assembly of the first connector half with the second connector half.

9. The combination of claim **8** wherein said engagement areas are generally convexly-curved surfaces.

10. The combination of claim **8** further including a latch mechanism, said latch mechanism including a latch arm located on the surface of said first connector half, said latch arm being resiliently attached to said first connector half for engagement with a portion of said second connector half to latch said first connector half to said second connector half when said first connector half is properly mated to said second connector half.

11. The combination of claim **10** further including an aperture in said latch arm for receiving a projection located on said second connector half, whereby when said first connector half is assembled to said second connector half, said projection enters said aperture for latching said first connector half to said second connector half.

12. The combination of claim **11** wherein said latch arm has as a reverse cantilever configuration.

13. The combination of claim **10** further including a latch restraint projecting upward from said planar body of said CPA device such that when said CPA device is located in said final position, said latch restraint will prevent movement of said latch arm, thereby preventing unlatching of said latch mechanism.

14. In combination, a first connector half, a second connector half, and a connector position assurance (CPA) device, comprising:

a first connector half having a pair of generally parallel guide channels aligned in a spaced relationship on the outer surface of said first connector half;

at least one raised lug near an end of at least one of said guide channels;

a second connector half mateable with said first connector half, said second connector half having at least one disengagement projection; and

a CPA device mountable within said guide channels on said first connector half, said CPA device including a planar body and a pair of generally parallel legs extending outward therefrom, at least one of said legs including a stub surface at the distal tip thereof, said at least one leg further including a locking surface located proximally of said stub surface and an engagement area extending between said stub surface and said locking surface, whereby, said CPA device may be mounted on said first connector half in an initial pre-lock position in which said stub surface, said engagement area, and said locking surface are retained between said raised lug and the end of said guide channel, and whereby, when said first connector half is properly assembled to said second connector half, said at least one disengagement projection on said second connector half contacts said engagement area on said at least one leg for disengaging said stub surface from said raised lug so that said stub surface may be moved past said raised lug, whereby when said CPA device has been moved forward a predetermined distance, said locking surface engages into contact with a forward edge of said raised lug to prevent removal of said CPA device such that said CPA device is thereby located in a final locked position indicative of proper assembly of the first connector half with the second connector half.

15. The combination of claim **14** wherein each said leg includes a said stub surface, a said engagement area, and a said locking surface.

16. The combination of claim 14 wherein said engagement area is a generally convexly-curved surface.

17. The combination of claim 14 further including a latch mechanism, said latch mechanism including a latch arm located on the surface of said first connector half, said latch arm being resiliently attached to said first connector half for engagement with a portion of said second connector half to latch said first connector half to said second connector half when said first connector half is properly mated to said second connector half.

18. The combination of claim 17 further including an aperture in said latch arm for receiving a projection located on said second connector half, whereby when said first connector half is assembled to said second connector half, said projection enters said aperture for latching said first connector half to said second connector half.

19. The combination of claim 18 wherein said latch arm has as a reverse cantilever configuration.

20. The combination of claim 17 further including a latch restraint projecting upward from said planar body of said CPA device such that when said CPA device is located in said final position, said latch restraint will prevent movement of said latch arm, thereby preventing unlatching of said latch mechanism.

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